Armed Forces Epidemiology Board

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DoD Global Influenza Surveillance Program: 2004-2005 Summary

Capt Scott Fujimoto
Risk Assessment Division
Epidemiology Services Branch
Brooks City-Base, TX
210-536-1788
scott.fujimoto@brooks.af.mil

DoD GEIS Global Emerging Infections System

AFIOH Air Force Institute for Operational Health

DoD Center for Deployment Health Research Naval Health Research Center

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DoD GEIS Global Emerging Infections System

Overview of Influenza Surveillance

DoD Influenza Surveillance

- Two main components, supervised and largely funded by DoD-GEIS
  - Population-based Recruit/Trainee Surveillance: managed at NHRC San Diego
  - Worldwide Sentinel Surveillance: managed at AFIOH at Brooks City-Base, TX
- Army also compiles their own respiratory virus report

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Program Methodology

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Methodology

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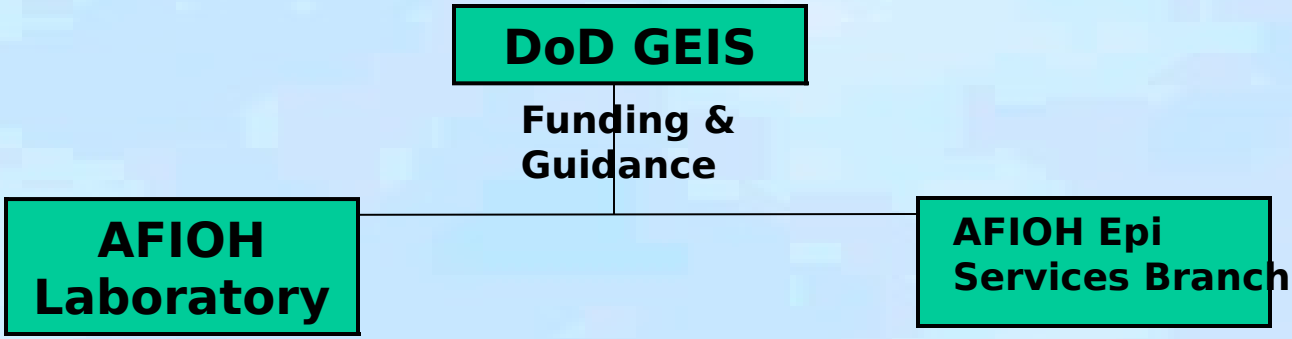
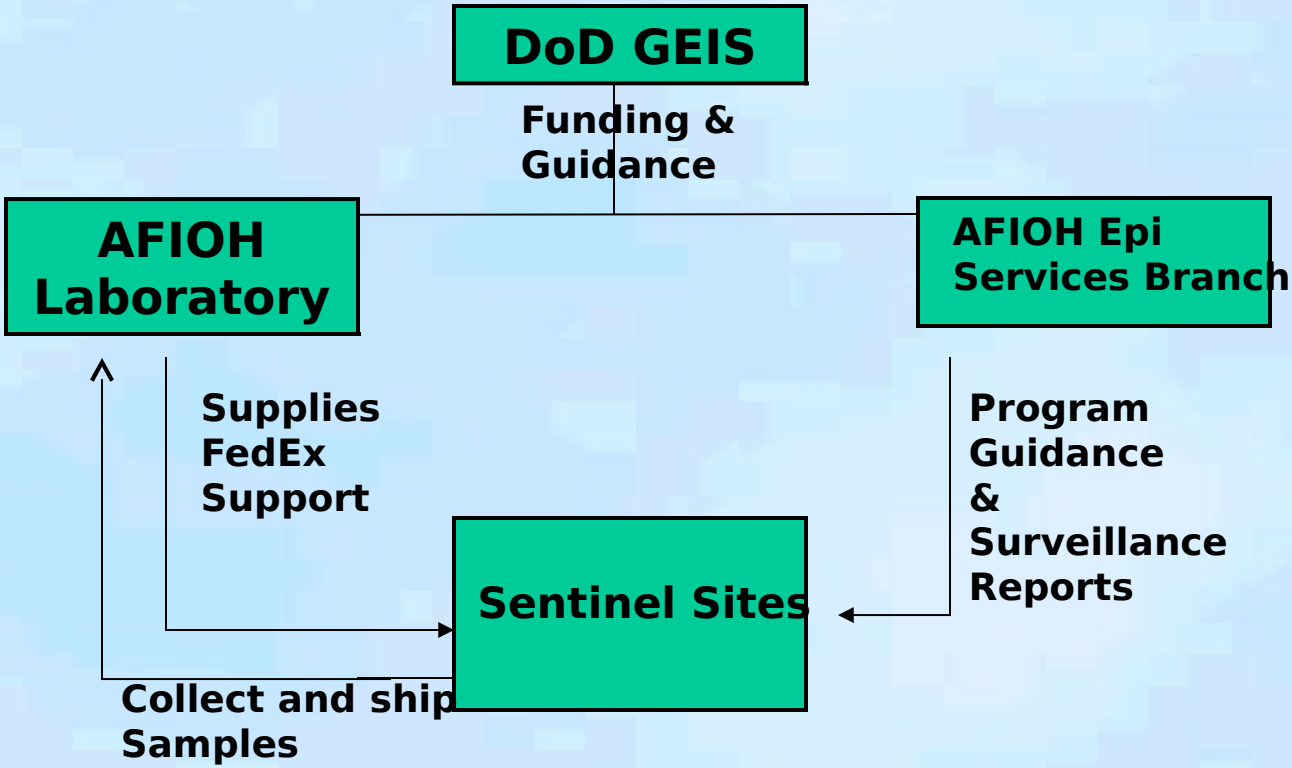
1) Sentinel sites regularly collect throat swab/nasal wash specimens from ILI cases
   - Non-sentinel sites can submit on as-needed clinical basis
2) AFIOH laboratory detects viruses (mainly through culture); Epidemiology Services summarizes in weekly reports and on website
   - Lab-lab transmission of individual patient results via secure website
3) Data summary shared with CDC as a WHO Collaborating Lab
   - Also specific isolates and molecular sequence information shared for further CDC analysis
4) Annual input to VRBPAC for next season's vaccine (also provided a seed virus for 2000-2001 vaccine)

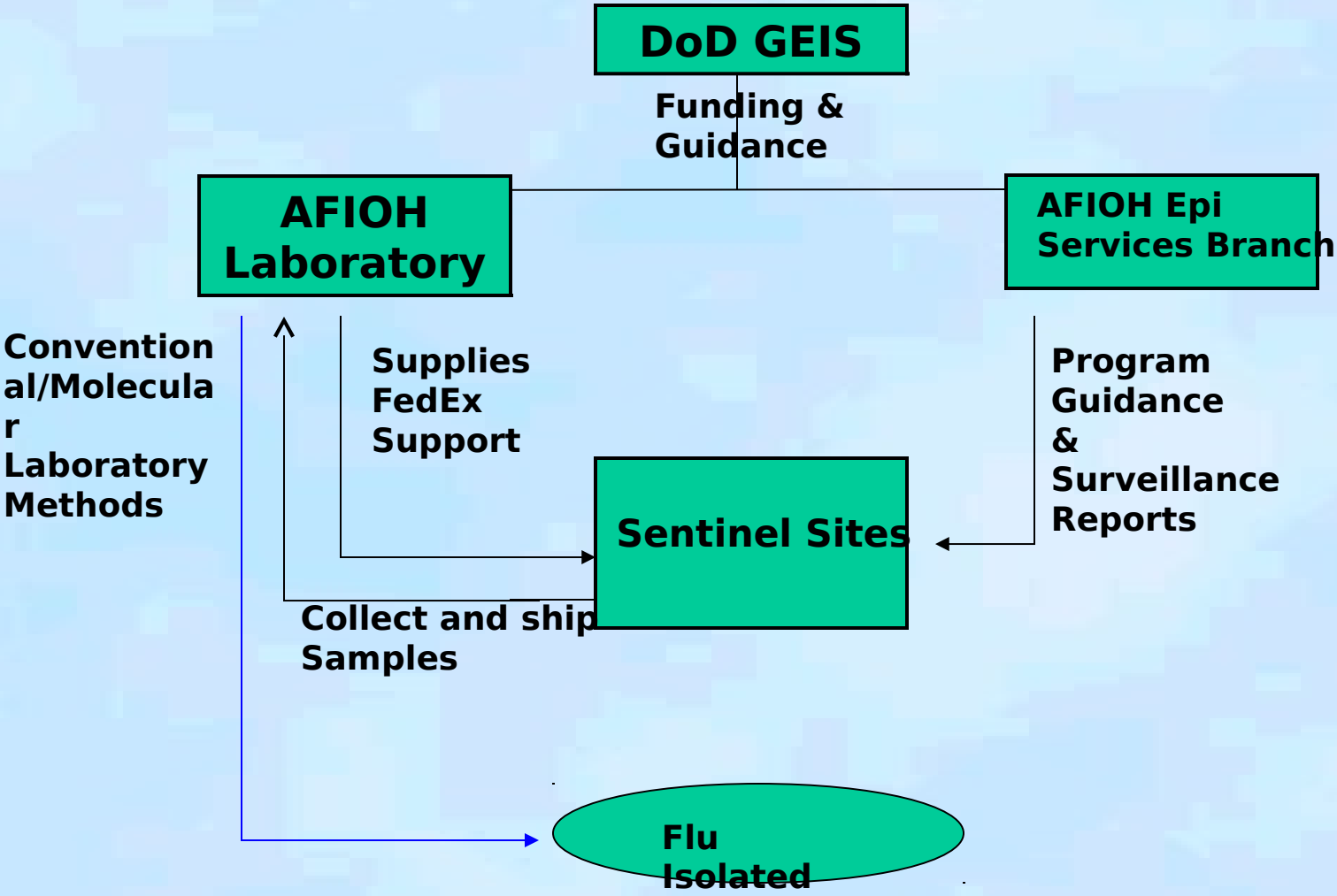
DoD Global Influenza Surveillance



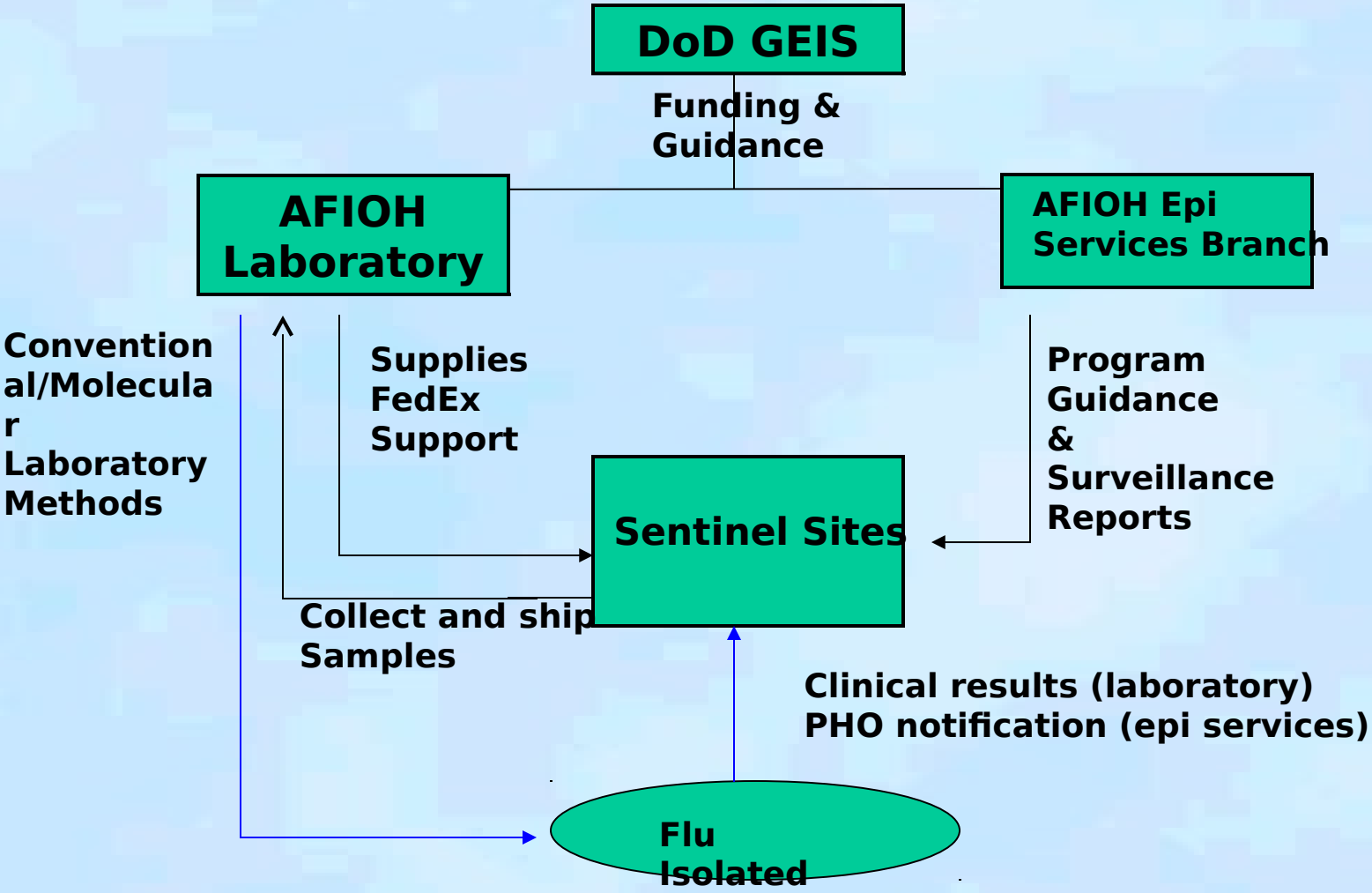
DoD Global Influenza Surveillance



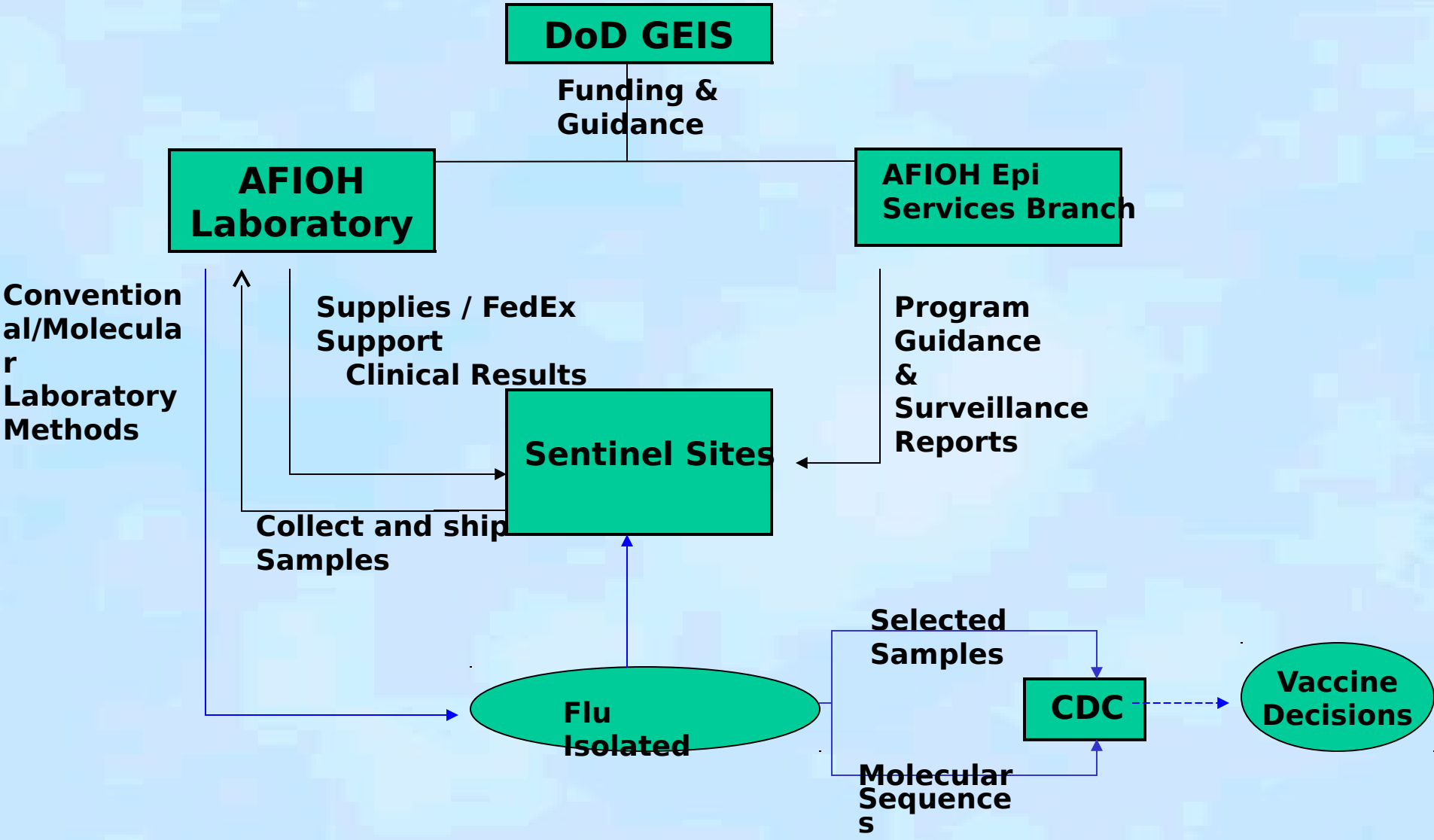
DoD Global Influenza Surveillance



DoD Global Influenza Surveillance



DoD Global Influenza Surveillance



2004-2005 Sentinel Sites

=Current sentinel

=New site

=Overseas lab

PCR Screening of Specimens

- Encourage submission of **nasal washes** over **throat swabs**
  - AFIOH molecular lab compared 25 matched-pair samples for direct specimen detection of influenza
  - 23 (92%) nasal washes detected versus 14 (56%) throat swabs
- Primers for universal influenza, Type A (plus H1 & H3 specific), Type B, and H5 (Avian)
  - Faster rule in/out for biosafety clearance
  - Goal: Ability for sites to screen for influenza (AFRIMS, military bases in Asia, shipboard screening)
  - Future development: Lyophilized reagents for “in-field” testing

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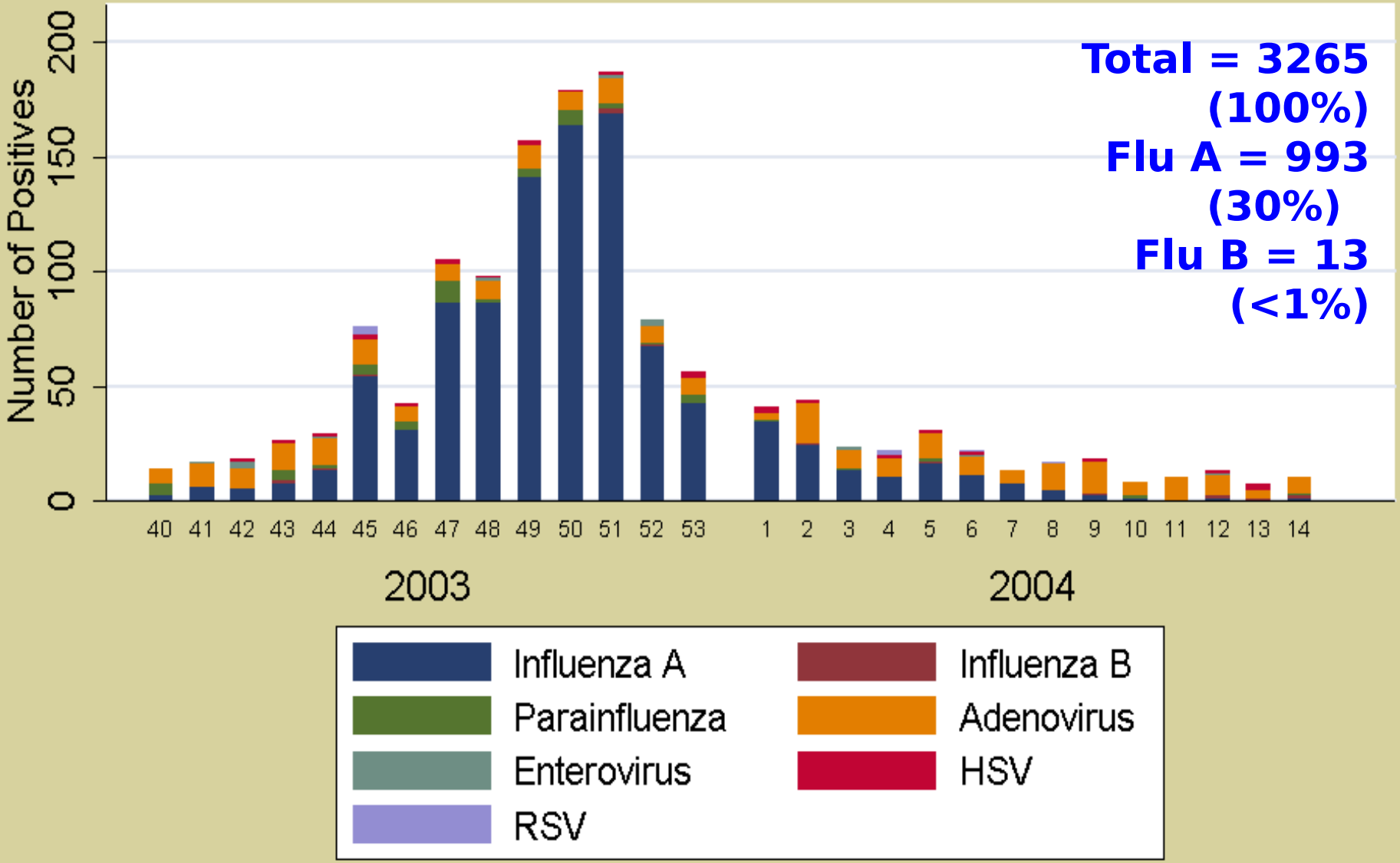
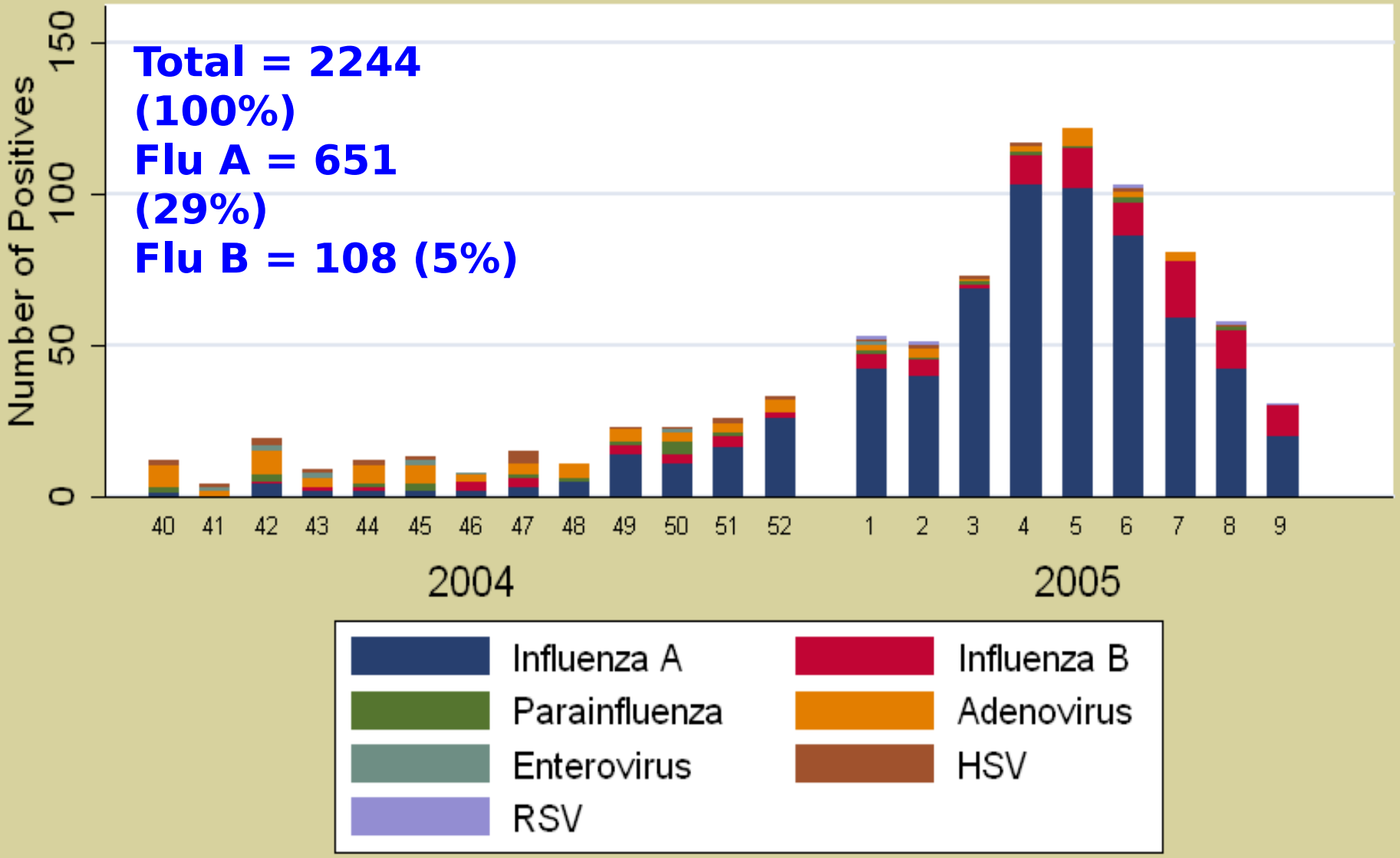
2004-2005 Season Results

Positive Viral Results by Week and Year
Influenza Season 2003-2004



As Of 20 Apr 2004

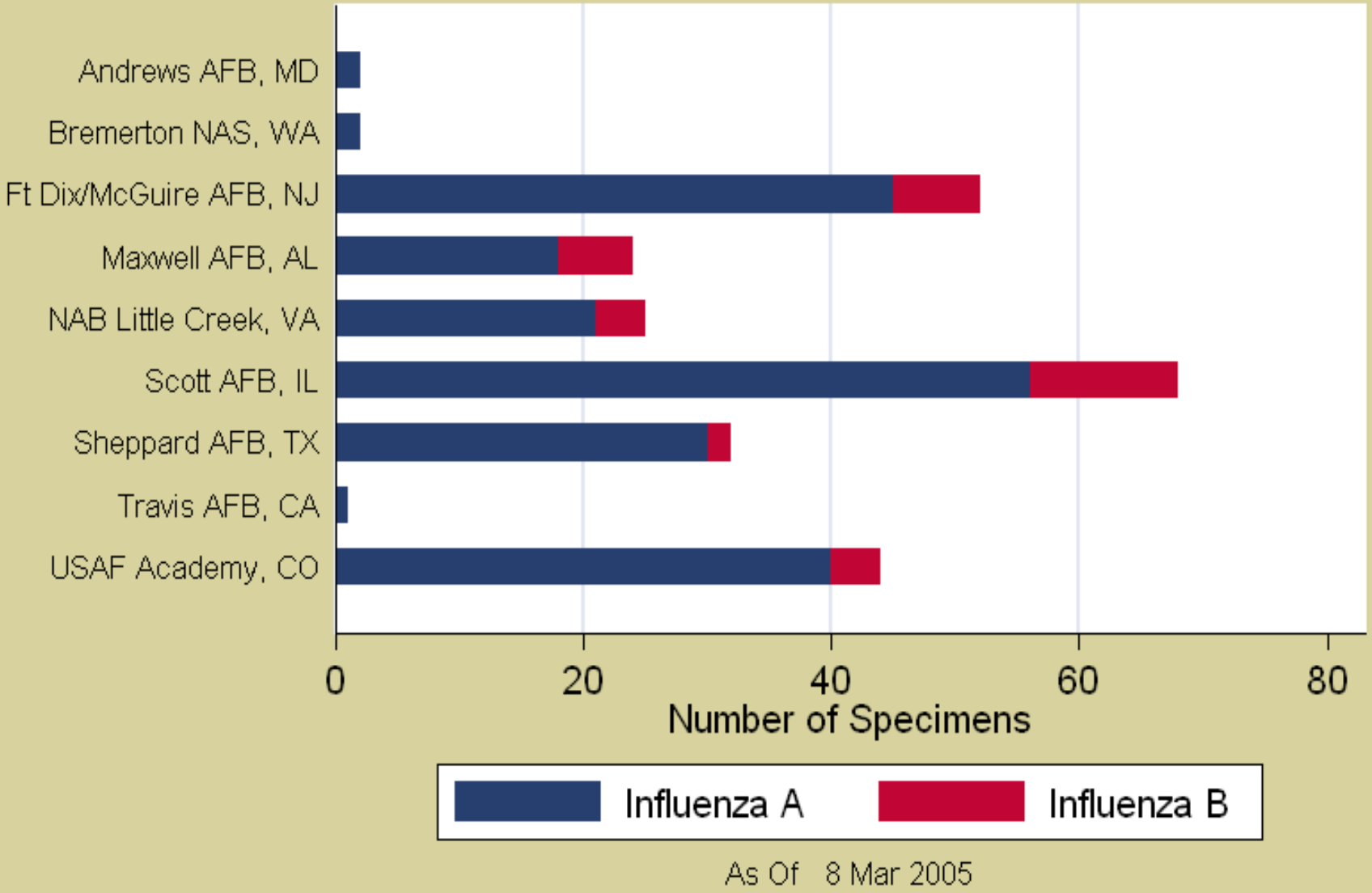
Positive Viral Results by Week and Year
Influenza Season 2004-2005



As Of 8 Mar 2005

Results of Specimens Received by CONUS Sentinel Site

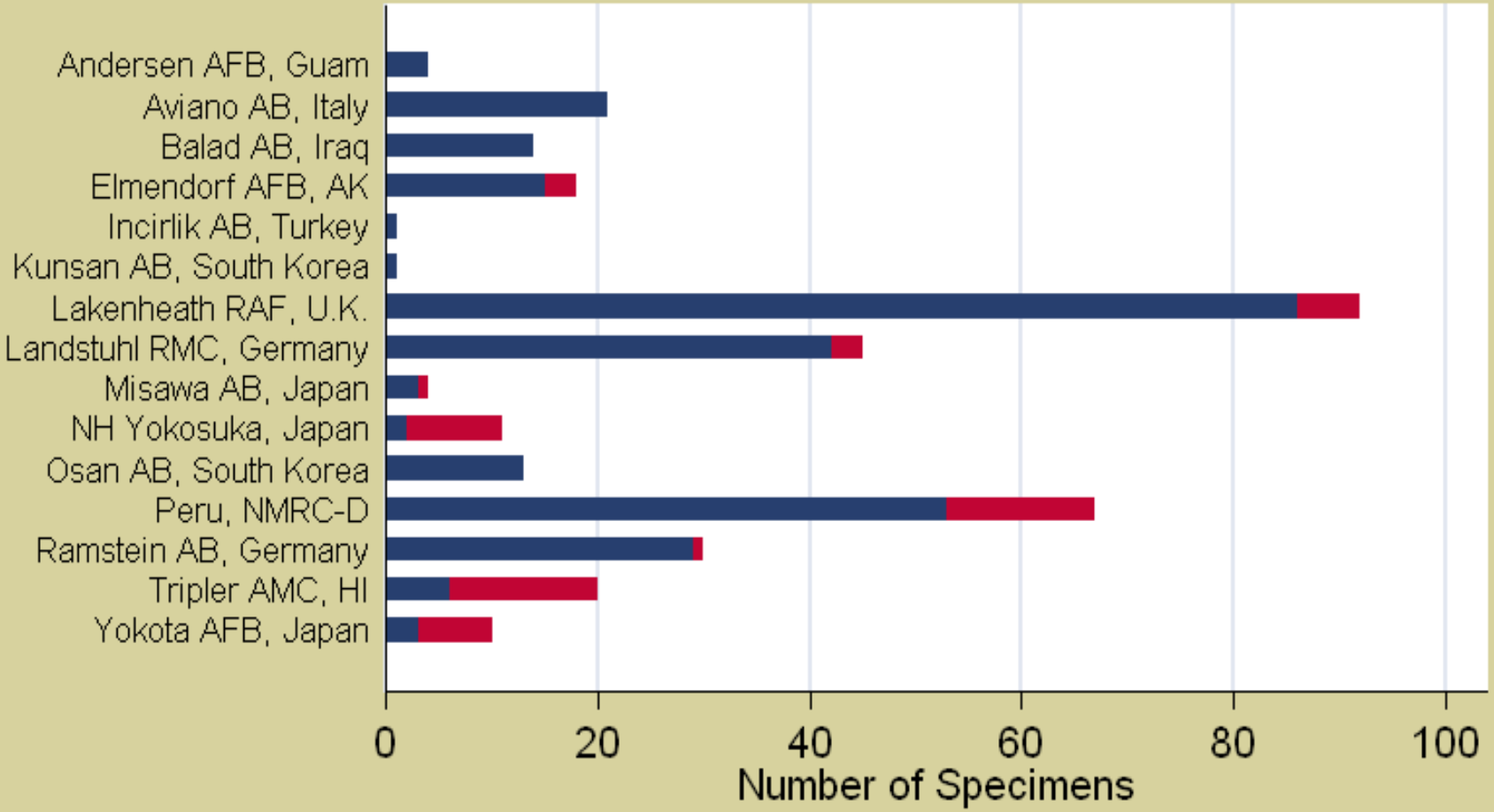
Influenza Season 2004-2005



As Of 8 Mar 2005

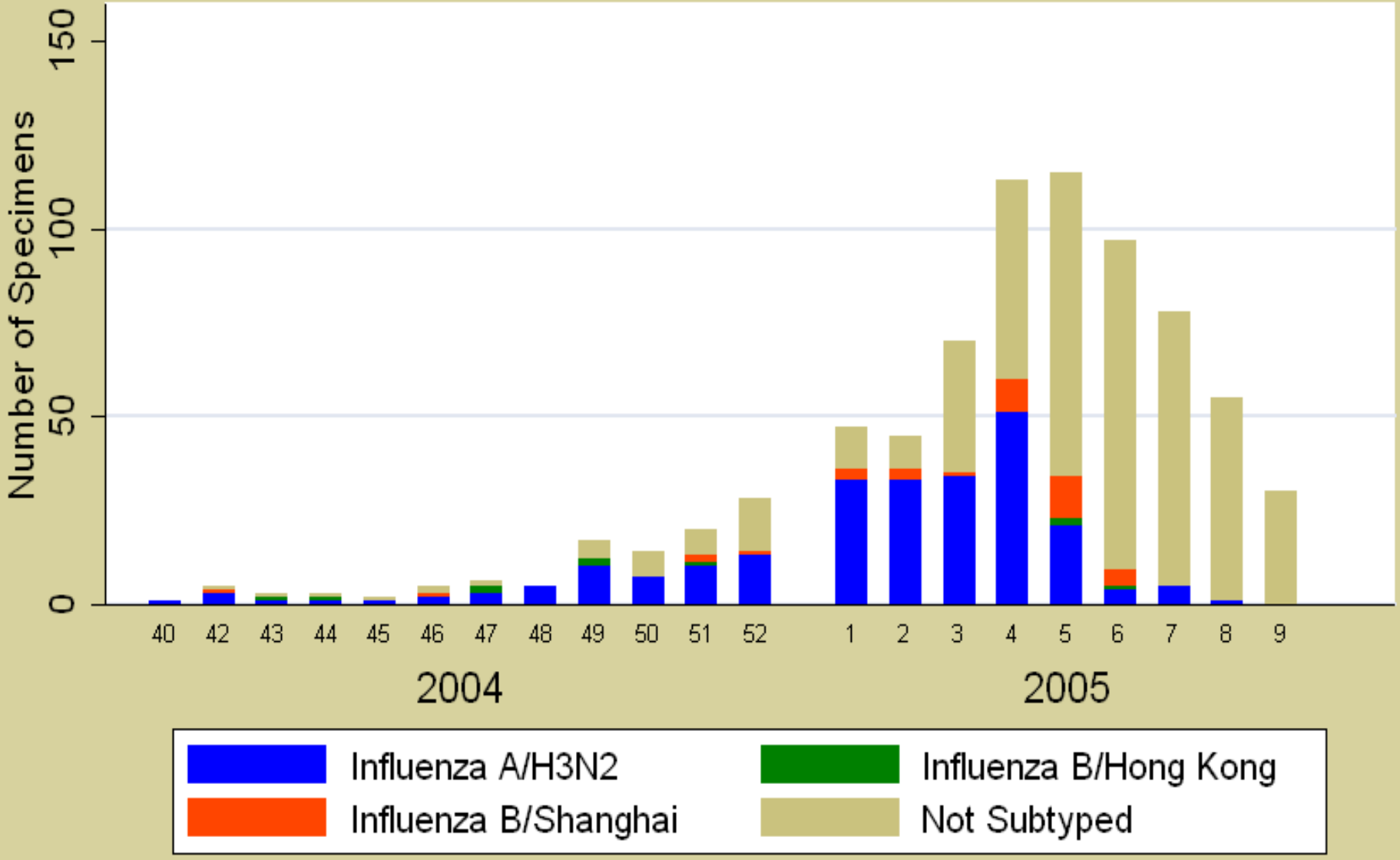
Results of Specimens Received by OCONUS Sentinel Site

Influenza Season 2004-2005



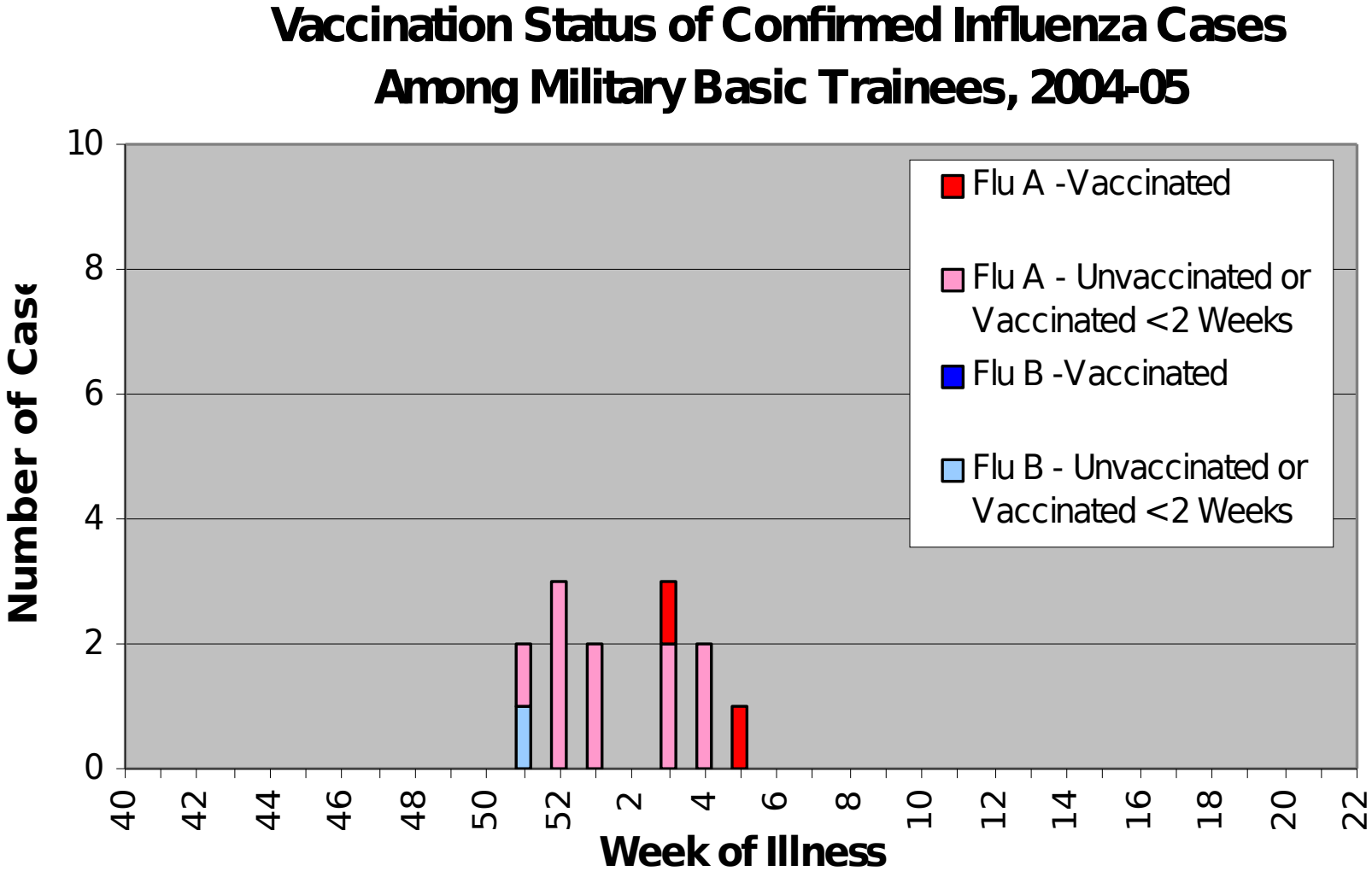
As Of 8 Mar 2005

Subtyping Results by Week and Year
Influenza Season 2004-2005



As Of 8 Mar 2005

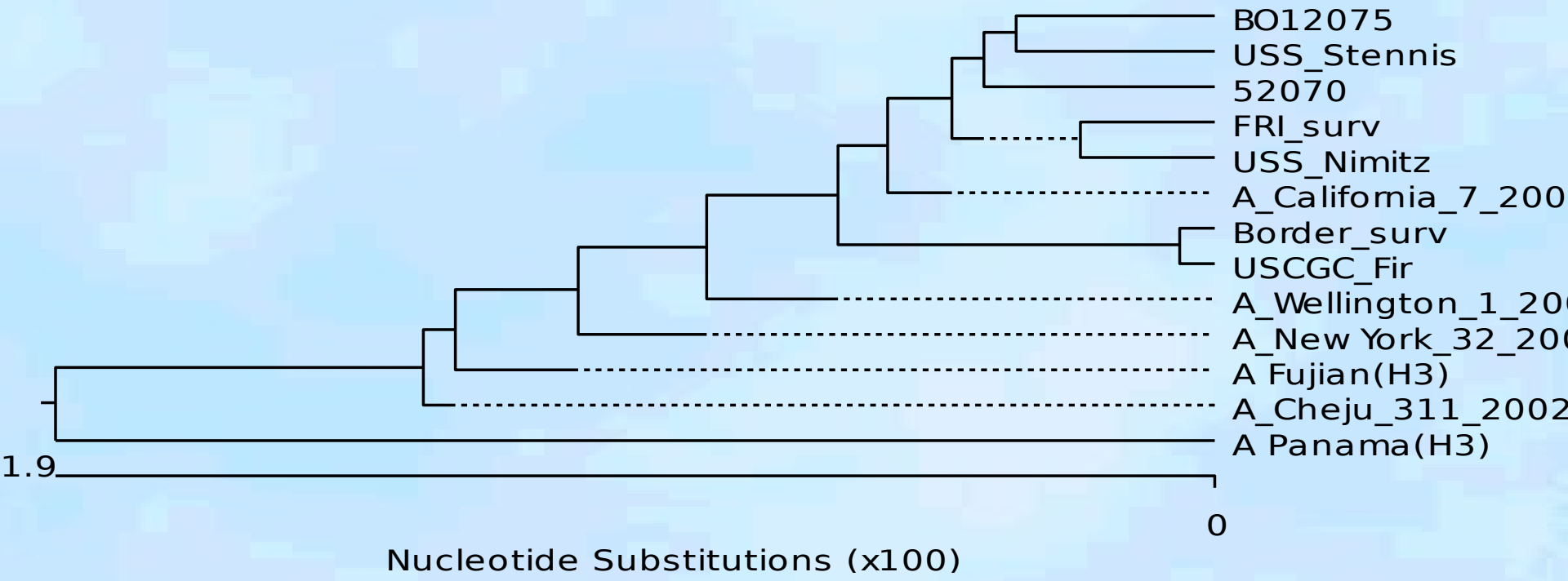
NHRC Recruit Surveillance Results



NHRC Shipboard Surveillance

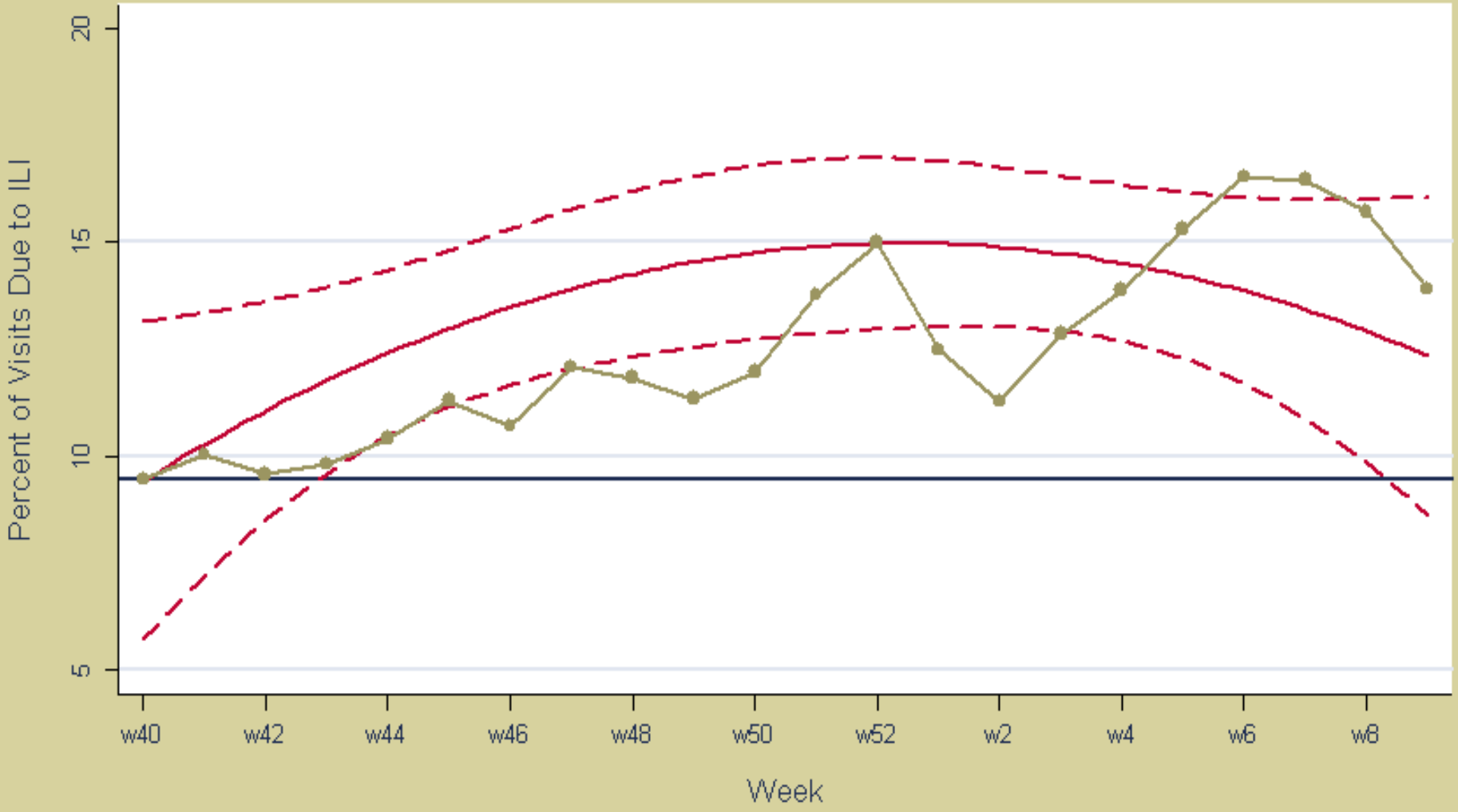
- Sep 04: A/H3N2, Fujian-like outbreak on aircraft carrier from Port Kalang, Malaysia
- Jan 05: A/H3N2, Fujian-like outbreak on aircraft carrier from San Diego, CA
- Feb 05: A/H3N2, California-like outbreak on USCG vessel from Oregon to San Diego
  - Nearly half of vaccinated 40-person crew became ill

NHRC Sequencing



ILI Proportion -- Global Military Health System

As of: 8 Mar 2005



Note: Horizontal Line is 2004 Interseasonal Threshold

- 2000-01

West Asia

- 2004-05
- 2003-04
- 2002-03
- 2001-02
- 2000-01

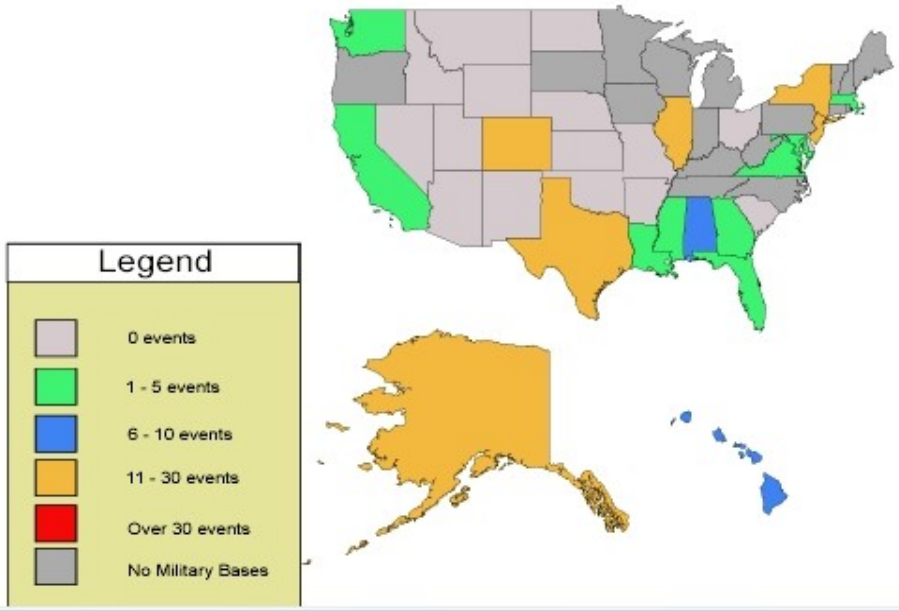
East Asia

- 2004-05
- 2003-04
- 2002-03
- 2001-02
- 2000-01

Europe

- 2004-05
- 2003-04
- 2002-03
- 2001-02
- 2000-01

State	Base	Event	Count
CO	Buckley AFB, CO	Influenza A/H3N2	3
CO	Buckley AFB, CO	Influenza A	1
CO	Buckley AFB, CO	Influenza B	1
CO	USAF	Influenza B	1



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Other Topics

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Other Topics: Overview

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- Avian Influenza
- Vaccine Breakthroughs
- Live intranasal vaccine “false positives”
- Vaccine Effectiveness Study
- Nepal Outbreak Investigation

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Avian Influenza Preparations

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- PCR development of H5 primers
- Strengthen ties with Asian sites
  - Training personnel at forward locations (e.g. AFRIMS) in PCR screening of influenza
  - Shipboard PCR training
- Monitor other surveillance systems (CDC, WHO)
- Future: Field screening for avian influenza using RAPID PCR machine and lyophilized (“dry”) reagents

Live Intranasal Vaccine and Laboratory Testing

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- Wider use of live intranasal vaccine among military personnel this season (ideal target population)
- "False positives" after live vaccine administration?
  - Study (Ali, 2004 CID) found positive DFA/EIA testing up to 7 days after administration
- AFIOH and NHRC have ability to differentiate between vaccine and wild-type influenza strains
- Reminder to adhere to ILI case definition when testing (especially fever)

Vaccine Breakthroughs

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- **Data sources**
  - **AF vaccination tracking database**
  - **Influenza laboratory database**
- **Breakthrough definition:**

  date of vaccination ≥ 14 days prior to specimen submission
- **63 breakthroughs out of all 695 influenza positives from military bases (9% compared to 22% last year)**

AFIOH Vaccine Effectiveness Study

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- **Secondary case cohort identified from index cases (Active Duty AF families only)**
  - Index cases: Influenza culture positive
  - Secondary Family Contacts: Cohort for study
- **Data from all family members (including index)**
  - Influenza vaccinations (inactivated or live): Validate with vaccine database
  - Febrile respiratory illnesses within 2 wks of index case
  - Symptoms/signs (to help verify ILI illness)
- **Calculate secondary attack rate**
  - Compare vaccinated and unvaccinated attack rates

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AF VE Data

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- Data analysis will be done once all surveys are completed and personal identifiers stripped
- 374 Vaccine Effectiveness Surveys have been conducted (index cases and household contacts)
- 95 influenza-confirmed index cases
- Projection time for results by June 1 (annual DoD influenza meeting)
- Aim for publishable study in peer-reviewed journal

Future AF VE Studies

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- **Incorporate VE study as routine part of influenza surveillance**
- **Expand to active case finding at sites with ongoing transmission**
  - Identify locations using lab submissions, ESSENCE, other reports
  - Validate influenza transmission in household contacts with medical records, interviews, additional testing
- **Compare inactivated versus live vaccine**

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Nepal Outbreak

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- **ILI outbreak in June 2004 in Bhutanese refugee camp investigated by AFRIMS**
- **64 patients, 42 (66%) with influenza A/H3N2, not Fujian strain.**

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Nepal Outbreak Sequencing Results

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HA1 position* Significance	145 Adjacent to AB site A	155 Fujian-like lineage	156 Fujian-like lineage	189 Antibody site B	226 Antibody site D	227 Antibody site D
A/Nepal/04*	N	T	H	N	I	P
A/Fujian/411/04	K	T	H	S	V	S
A/Wyoming/3/03	K	T	H	S	I	S
A/Wellington/1/04	K	T	H	N	V	P
A/Panama/2020 07/99	K	H	Q	S	V	S

Nepal Sequence differs from 4/6 sites for Fujian Strain. All 4 changes seen in California strain.

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Summary

2004-2005 Summary

- **Type and subtype remarkably similar to last year**
  - A/H3N2 predominant
  - Peak later in season compared to 2003-2004 (but more consistent with previous seasons)
  - Relatively greater frequency of B in Asia/Pacific region
- **Nepal strain detected July 2004 had 4 amino acid sequence change later found in emerging California strain**

2004-2005 Accomplishments

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- Increased world-wide surveillance sites
- Development of primers for PCR screening
- Continued development of influenza sequencing capabilities
  - Influenza outbreak investigations
  - Live vaccine vs. “wild-type” strains
- Continuation of vaccine effectiveness study
- Monitoring trends
  - Breakthrough infections
  - Genetic drift through sequencing

Annual DoD Influenza Surveillance Working Group Meeting

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- Directed by ASD/HA policy
- Scheduled for 1-2 June (San Antonio, TX)
- Participants
  - Key players: DoD-GEIS, AFIOH, NHRC, HA
  - Other Guests: CDC, Overseas labs
- Topics
  - Season Summary
  - Vaccine Effectiveness
  - Avian Influenza
  - Sentinel site selection
  - Coordination of surveillance with CDC

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Questions & Discussion

https://gumbo.brooks.af.mil/pestilence/Infl

AFIOH
Air Force Institute for Operational Health

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Vaccination Stats

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- 80% of AD AF personnel have been vaccinated as of 14 Feb 05
- Recruits have received FluMist
- No virus tested has been consistent with the seed virus for FluMist

Six-Seasonal Year Review

1998-1999 through 2003-2004

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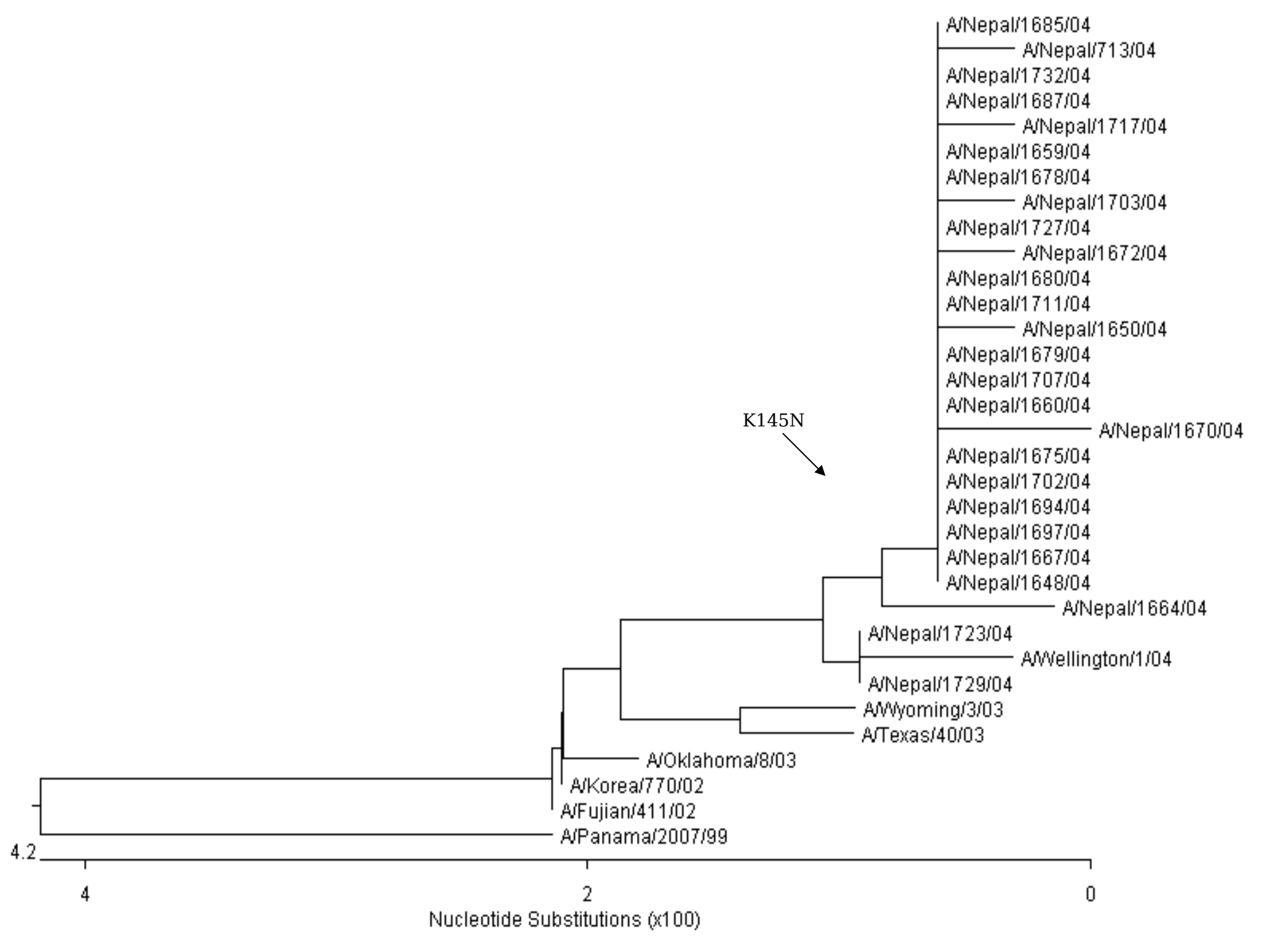
Specimen Result	Seasonal Year						
	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005*
Negative	73%	59%	66%	61%	58%	58%	63%
Adenovirus	3%	33%	16%	18%	20%	11%	5%
Enterovirus	0%	0%	1%	1%	1%	1%	1%
Herpes Simplex Virus	2%	1%	1%	2%	1%	1%	2%
Influenza A	15%	6%	6%	14%	8%	25%	26%
Influenza B	5%	1%	7%	3%	8%	2%	3%
Parainfluenza	2%	1%	1%	1%	2%	2%	1%
Respiratory Syncytial Virus	0%	0%	1%	1%	1%	0%	0%

***2004-2005 data includes specimens collected from 01 October 2004 through 4 February 2005.**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A/Wellington/1/04
A/Nepal/1729/04
A/Wyoming/3/03
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Nucleotide Substitutions (x100)